Montana Fish, Wildlife & Parks

SPECIFICATIONS FOR WORK
SPECIAL PROVISIONS

Contents:

1. PROJECT DESCRIPTION

The Project involves construction work associated with:

Weir Repairs at the Whitetail Reservoir, near the
Whitetail Reservoir Fishing Access Site (FAS)
Fish, Wildlife & Parks (FWP) project #7073704
Located in Daniels County, MT

The project generally includes removal & replacement of existing steel pile caps, driving existing sheet piles down to design elevations, installation of H-pile & bracing, associated welding, removal and replacement of existing riprap, and associated incidentals.

2. PROJECT RELATED CONTACTS

Project contacts are designated as follows:

Owner:	Montana FWP 1420 E. Sixth Ave. PO Box 200701 Helena, MT 59620-0701
FWP Project Representative:	Phil Jagoda, P.E. FWP Project Manager 1522 9th Avenue Helena, MT 59620 406-841-4009 (wk) 406-431-3755 (cell) 406-841-4004 (fax)

3. SITE INSPECTION

All Bidders should satisfy themselves as to the construction conditions by personal examination of the site described in this document. Bidders are encouraged to make any investigations necessary to assess the nature of the construction and the difficulties to be encountered, see General Conditions, Article 3.

4. SOILS INFORMATION

Geotechnical investigation work has not been done for this Project. It is the responsibility of the Bidders to conduct all investigations and determine the soil type and digging conditions that may be encountered with this Project prior to bid preparation, see General Conditions, Article 3.

5. PROJECT REPRESENTATIVE, INSPECTIONS, AND TESTING

The Contractor's work will be periodically tested and observed to insure compliance with the Contract Documents. Complete payment will not be made until the Contractor has demonstrated that the work is complete and has been performed as required. If the Project Representative detects a discrepancy between the work and the requirements of the Contract Documents at any time, up to and including final inspection, such work will not be completely paid for until the Contractor has corrected the deficiency, see General Conditions, Article 9.

The Project Representative will periodically monitor the construction of work to determine if the work is being performed in accordance with the contract requirements. The Project Representative does not have the authority or means to control the Contractor's methods of construction. It is, therefore, the Contractor's responsibility to utilize all methods, equipment, personnel, and other means necessary to assure that the work is installed in compliance with the Drawings and Specifications, and laws and regulations applicable to the work. Any discrepancies noted shall be brought to the Contractor's attention, who shall immediately correct the discrepancy. Failure of the Project Representative to detect a discrepancy will not relieve the Contractor of his ultimate responsibility to perform the work as required, see General Conditions, Article 3.

The Contractor shall inspect the work as it is being performed. Any deviation from the Contract requirements shall be immediately corrected. Prior to any scheduled observation by the Project Representative, the Contractor shall again inspect the work and certify to the Project Representative that he has inspected the work and it meets the requirements of the Contract Documents. The Project Representative may require uncovering of work to verify the work was installed according to the contract documents, see General Conditions, Article 12.

The work will be subject to review by the Project Representative. The results of all such observations, and all contract administration, shall be directed to the Contractor only through the Project Representative.

5.1 Services Required by the Contractor. The Contractor shall provide the following services:

a. Any field surveys to establish locations, elevations, and alignments as stipulated on the Contract Documents. FWP reserves the right to set preliminary construction staking for the project. The Contractor is responsible to notify FWP for any construction staking discrepancies.

b. Preparation and certification of all required shop drawings and submittals as described in the General Conditions, Article 3.

c. All testing requiring the services of a laboratory to determine compliance with the Contract Documents shall be performed by an independent commercial testing laboratory acceptable to the Project Representative. The laboratory shall be staffed with experienced technicians properly equipped, and fully qualified to perform the tests in accordance with the specified standards.

d. Preparation and submittal of a construction schedule, including submittals, see General Conditions, Article 3. The schedule shall be updated as required, as defined in the Contract Documents.

e. All Quality Control testing as required by the Contractor's internal policies.

f. All Quality Assurance testing and/or re-testing as stated in the Contract Documents, see General Conditions, Article 13.

5.2 Services Provided by the Owner. The Owner shall provide the following services at no cost to the Contractor except as required for retests as defined in the Contract Documents.

a. The Project Representative may check compaction of backfill and surfacing courses using laboratory testing submittal information supplied by the Contractor. These tests are to determine if compaction requirements are being fulfilled in accordance with the Contract Documents. It is ultimately the responsibility of the Contractor to insure that this level of compaction is constant and met in all locations.

b. Any additional Quality Assurance testing deemed appropriate by the Owner, at the Owner's expense.

6. ENGINEERING INTERPRETATIONS

Timely Engineering decisions on construction activities or results have an important bearing on the Contractor's schedule. When engineering interpretation affects a plan design or specifications change, it should be realized that more than 24 hours may be required to gain the necessary Owner participation in the decision process including time for formal work directive, or change order preparation as required.

7. REJECTED WORK

Any defective work or nonconforming materials or equipment that may be discovered at any time prior to the expiration of the warranty period, shall be removed and replaced with work or materials conforming to the provisions of the Contract Documents, see General Conditions, Article 12. Failure on the part of the Project Representative to condemn or reject bad or inferior work, or to note nonconforming materials or equipment on the Contractors submittals, shall not be construed to imply acceptance of such work. The Owner shall reserve and retain all its rights and remedies at law against the Contractor and

its Surety for correction of any and all latent defects discovered after the guarantee period (MCA 27-2-208).

Only the Project Representative will have the authority to reject work which does not conform to the Contract Documents.

8. UTILITIES

The exact locations of existing utilities that may conflict with the work are not precisely known. It shall be the Contractor's responsibility to contact the owners of the respective utilities and arrange for field location services. **One Call Locators, 1-800-424-5555**

The Contract Documents may show utility locations based on limited field observation and information provided to the Project Representative by others. **The Project Representative cannot guarantee their accuracy.** The Contractor shall immediately notify the Project Representative of any discrepancies with utility locations as shown on the Contract Drawings and/or their bury depths that may in any way affect the intent of construction as scoped in these specifications.

There will be no separate payment for exploratory excavation required to locate underground utilities.

8.1 Notification. The Contractor shall contact, in writing, all public and private utility companies that may have utilities encountered during excavation. The notification includes the following information:

a. The nature of the work that the Contractor will be performing.
b. The time, date and location that the Contractor will be performing work that may conflict with the utility.
c. The nature of work that the utility will be required to perform such as moving a power pole, supporting a pole or underground cable, etc.
d. Requests for field location and identification of utilities.

A copy of the letter of notification shall be provided to the Project Representative. During the course of construction, the Contractor shall keep the utility companies notified of any change in schedule, or nature of work that differs from the original notification.

8.2 Identification. All utilities that may conflict with the work shall be the Contractor's responsibility to locate before any excavation is performed. Field markings provided by the utility companies shall be preserved by the Contractor until actual excavation commences. All utility locations on the Drawings should be considered approximate and should be verified in the field by the Contractor. The Contractor shall also be responsible for locating all utilities that are not located on the Drawings.

Utilities are depicted on the Contract Documents in accordance with their

achieved “Quality Levels,” as defined in the American Society of Civil Engineer’s Document, ASCE 38, “Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data.”

Reliance upon these data for risk management purposes during bidding does not relieve the Contractor, or Utility Owner from following all applicable utility damage prevention statutes, policies, and/or procedures during construction. It is important that the Contractor investigates and understands the scope of work between the project Owner and Engineer regarding scope of limits of the utility investigations leading to these utility depictions. Definitions of Quality Levels are described as follows:

a. "QUALITY LEVEL A" – (QLA): LOCATING THROUGH EXCAVATION. QLA data are highly accurate and are obtained by surveying an exposed utility. As such, both horizontal and vertical data are recorded. Survey accuracies are typically set at 15mm (1/2-inch) vertically, and to project survey standards horizontally (typically the same as for topography features), although these survey accuracies and precisions are generally left to the owner to specify in a scope of work. In addition to the applicable standard of care and any other additional standards imposed by commercial indemnity clauses, the accuracy of these location data is also typically guaranteed. Other data typically characterized include material type, surface elevation, utility size/capacity, outside dimensions, and configurations, soil type, and utility condition.

b. "QUALITY LEVEL B" – (QLB): DESIGNATING. QLB information is obtained through the application of appropriate surface geophysical methods to identify the existence and approximate horizontal location of utilities (a utility’s “designation”) within the project limits, followed by survey, mapping, and professional review of that designation. Underground utilities are identified by interpretation of received signals generated either actively or passively, and through correlating these received signals with visible objects (QLC) and record data (QLD) to determine function. Designated utilities that can’t be identified are labeled as “unknowns.” Although approximate has no accuracy associated with it, generally the locations are within inches rather than feet. The more utility congested the area or the deeper the utilities, the less likely it is that the designations will achieve that accuracy. These designations are then surveyed to project accuracies and precisions, typically third-order accuracy similar to other topography features. Note that surveying existing one-call marks does not lead to QLB data, since the genesis of the marks was not under the direct responsible charge of the professional certifying the QLB depictions, and one-call generally does not address unknown utilities, privately owned utilities, utilities without records, abandoned utilities, and so on.

Nor does the professional have knowledge of the field technician's qualifications, training, and level of effort.

"

c. QUALITY LEVEL C" – (QLC): SURFACE VISIBLE FEATURE SURVEY. QLC builds upon the QLD information by adding an independent detailed topography site survey for surface-visible appurtenances of subsurface utilities including but not limited to fire hydrants, valves, risers, and manholes. Professional judgment is used to correlate the QLD data to the surveyed features, thus increasing the reliability of both utility location and existence. It is a function of the professional to determine when records and features do not agree and resolve discrepancies. This may be accomplished by depiction of a utility line at quality level D, effectively bypassing or disregarding (but still depicting) a surveyed structure of unknown origin. Additional resolution may result from consultation with utility owners.

d. "QUALITY LEVEL D" – (QLD): EXISTING RECORDS RESEARCH. QLD is the most basic level of information. Information is obtained from the review and documentation of existing utility records, verbal accounts, and/or one-call markings (to determine the existence of major active utilities and their approximate locations).

8.3 Removal or Relocation of Utilities. All electric power, street lighting, gas, telephone, and television utilities that require relocation will be the responsibility of the utility owner. A request for extending the specified contract time will be considered if utility owners cause delays.

8.4 Public Utilities. Water, sewer, storm drainage, and other utilities owned and operated by the public entities shall, unless otherwise specifically requested by the utility owner, be removed, relocated, supported or adjusted as required by the Contractor at the Contractor's expense. All such work shall be in accordance with these Contract Documents, or the Owner's Standard Specifications or written instructions when the work involved is not covered by these Specifications.

8.5 Other Utilities. Utilities owned and operated by private individuals, railroads, school districts, associations, or other entities not covered in these Special Provisions shall, unless otherwise specifically requested by the utility owner, be removed, relocated, supported or adjusted as required by the Contractor at the Contractor's expense. All work shall be in accordance with the utility owner's directions, or by methods recognized as being the standard of the industry when directions are not given by the owner of the utility.

8.6 Damage to Utilities and Private Property. The Contractor shall protect all utilities and private property and shall be solely responsible for any damage resulting from his construction activities. The Contractor shall hold the Owner and Project Representative harmless from all actions resulting from his failure to properly protect utilities and private property. All damage to utilities shall be repaired at the Contractor's expense to the full satisfaction of the owner of the damaged utility or property. The Contractor shall provide the Owner with a letter from the owner of the damaged utility or property stating that it has been repaired to the utility owner's full satisfaction.

8.7 Structures. The Contractor shall exercise every precaution to prevent damage to existing buildings or structures in the vicinity of his work. In the event of such damages, he shall repair them to the satisfaction of the owner of the damaged structure at no cost to the Owner.

8.8 Overhead Utilities. The Contractor shall use extreme caution to avoid a conflict, contact, or damage to overhead utilities, such as power lines, streetlights, telephone lines, television lines, poles, or other appurtenances during the course of construction of this project.

8.9 Buried Gas Lines. The Contractor shall provide some means of overhead support for buried gas lines exposed during trenching to prevent rupture in case of trench caving.

8.10 Pavement Removal. Where trench excavation or structure excavation requires the removal of curb and gutter, concrete sidewalks, or asphalt or concrete pavement, the pavement or concrete shall be cut in a straight line parallel to the edge of the excavation by use of a spade-bitted air hammer, concrete saw, colter wheel, or similar approved equipment to obtain a straight, square clean break. Pavement cuts shall be 2 feet wider than the actual trench opening.

8.11 Survey Markers and Monuments. The Contractor shall use every care and precaution to protect and not disturb any survey marker or monuments, such as those that might be located at lot or block corners, property pins, intersection of street monuments or addition line demarcation. Such protection includes markings with flagged high lath and close supervision. No monuments shall be disturbed without prior approval of the Project Representative. Any survey marker or monument disturbed by the Contractor during the construction of the project shall be replaced at no cost to the Owner by a licensed land surveyor.

8.12 Temporary Utilities. The Contractor shall provide all temporary electrical, lighting, telephone, heating, cooling, ventilating, water, sanitary, fire protection, and other utilities and services necessary for the performance of the work. All fees, charges, and other costs associated therewith shall be paid for by the Contractor.

9. CONSTRUCTION SAFETY

The Contractor shall be solely and completely responsible for conditions of the jobsite, including safety of all persons (including employees and subcontractors) and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to U.S. Department of Labor (OSHA), and all other applicable federal, state, county, and local laws, ordinances, codes, and regulations. Where any of these are in conflict, the more stringent requirement shall be followed. The Contractor's failure to thoroughly familiarize himself with the aforementioned safety provisions shall not relieve them from compliance with the obligations and penalties set forth therein, see General Conditions, Article 10.

10. CONSTRUCTION LIMITS AND AREAS OF DISTURBANCE

10.1 Construction Limits. Where construction easements or property lines, are not specifically called out on the Contract Documents, limit the construction disturbance to ten (10) feet, when measured from the edge of the slope stake grading, or to the adjacent property line, whichever is less. Disturbance and equipment access beyond this limit is not allowed without the written approval of both the Project Representative and the Owner of the affected property. If so approved, disturbance beyond construction limits shall meet all requirements imposed by the landowner; this includes existing roads used and/or improved as well as the construction of new access roads. Special construction, reclamation, or post-construction reclamation or other closure provisions required by the landowner on access roads beyond the construction limits shall be performed by the Contractor at no additional cost to the Owner.

10.2 Areas of Disturbances. Approved areas of disturbance are those areas disturbed by construction activities within the construction limits and along designated or approved access routes. Such areas may require reclamation and revegetation operations, including grading to the original contours, top soiling with salvaged or imported topsoil, seeding, fertilizing, and mulching as specified herein. Other areas that are disturbed by the Contractor's activities outside of the limits noted above will be considered as site damage or unapproved areas of disturbance, see General Conditions, Articles 3 and 10. This includes areas selected by the Contractor outside the defined construction limits for mobilization, offices, equipment, or material storage.

11. DECONTAMINATE CONSTRUCTION EQUIPMENT

Power wash all construction equipment entering the project site to prevent the spread of noxious weeds and aquatic invasive species. This applies to all FWP projects, whether or not individual construction permits specifically address cleaning of equipment.

12. TREE PROTECTION AND PRESERVATION

The Contractor and the Owner shall individually inspect all trees within the project construction limits prior to construction. The Owner shall determine which trees are to be removed and which trees are to be preserved. Construction of the grading, utilities and various roadway facilities must not significantly damage the trees root system or hinder it's chances for survival. Reasonable variations from the Contract Documents, as directed by the Project Representative, may be employed to ensure the survival of trees.

13. CONSTRUCTION SURVEYS

The Contractor will be responsible for all layout and construction staking utilizing the Project Representative's existing control and coordinate data for the project. Dimensions and elevations indicated in layout of work shall be verified by the Contractor.
Discrepancies between Drawings, Specifications, and existing conditions shall be referred to the Project Representative for adjustment before work is performed. The Project Representative may set location and grade stakes prior to construction; however, it is ultimately the responsibility of the Contractor to check and verify all construction staking for the project.

Existing survey control (horizontal and vertical) has been set for use in the design and ultimately the construction of these improvements. A listing of the coordinates and vertical elevation for each of these control points may be included in the project drawings.

The Contractor will be responsible for preserving and protecting the survey control until proper referencing by the Contractor has been completed. Any survey control obliterated, removed, or otherwise lost during construction will be replaced at the Contractor's expense.

Contractor shall be aware of property pins and survey monuments. Damage to these pins will require replacement of such by a registered land surveyor at no cost to the owner.

The Contractor shall provide construction staking from the Contractor's layouts and the control points. Contractor's construction staking includes at a minimum:

1. Slope stakes located at critical points as determined by the Project Representative.
2. Blue tops every longitudinally and transversely for subgrade and crushed base to verify finish grading of course.
3. Location and grade stakes for drainage features and retaining walls.
4. Location stakes for roadside safety items, permanent and temporary traffic control, and misc. items as determined by the Project Representative.

Original field notes, computations and other records take by the Contractor for the purpose of quantity and progress surveys shall be furnished promptly to the Project Representative and shall be used to the extent necessary in determining the proper amount of payment due to the Contractor.

14. MATERIAL SOURCES AND CONSTRUCTION WATER

The Contractor shall be responsible for locating all necessary material sources, including aggregates, earthen borrow and water necessary to complete the work. The Contractor shall be responsible for meeting all transportation and environmental regulations as well as paying any royalties. The Contractor shall provide the Project Representative with written approvals of landowners from whom materials are to be obtained, prior to approval.

The Contractor may use materials from any source, providing the materials have been tested through representative samples and will meet the Specifications.

Water for compaction efforts shall be supplied by the Contractor.

15. MATERIALS SALVAGE AND DISPOSAL

Notify the Owner for any material salvaged from the project site not identified in the Contract Documents. The Owner reserves the right to maintain salvaged material at the project site, compensate the Contractor for relocation of salvaged material, or agreed compensation to Owner for material salvaged by the Contractor.

Haul and waste all waste material to a legal site and obey all state, county, and local disposal restrictions and regulations.

16. STORED MATERIALS

Contractor shall use an approved storage area for materials. Materials and/or equipment purchased by the Contractor may be compensated on a monthly basis. For compensation, provide the Project Representative invoices for said materials, shop drawings and/or submittals for approval, and applicable insurance coverage, see General Conditions, Article 9.

17. STAGING AND STOCKPILING AREA

Contractor shall use staging and stockpiling sites for to facilitate the project as approved by the Owner. Contract Documents may show approved staging and stockpiling locations. Notify Owner within 24 hours for approval of staging and stockpiling sites not shown on the Contract Drawings.

18. SECURITY

The Contractor shall provide all security measures necessary to assure the protection of equipment, materials in storage, completed work, and the project in general.

19. CLEANUP

Cleanup for each item of work shall be fully completed and accepted before the item is considered final. If the Contractor fails to perform cleanup within a timely manner the Owner reserves the right to withhold final payment.

20. ACCESS DURING CONSTRUCTION

Provide emergency access at all times within the project throughout the construction period.

21. CONSTRUCTION TRAFFIC CONTROL

The Contractor is responsible for providing safe construction and work zones within the project limits by implementing the rules, regulations, and practices of the Manual on Uniform Traffic Control Devices, current edition.

22. SANITARY FACILITIES

Provide on-site toilet facilities for employees of Contractor and Sub-Contractors and maintain in a sanitary condition.

23. CONTRACT CLOSEOUT

The Contractor's Superintendent shall maintain at the project site, a "Record Set of Drawings" showing field changes, as-built elevations, unusual conditions encountered during construction, and such other data as required to provide the Owner with an accurate "as constructed" set of record drawings. The Contractor shall furnish the "Record Set" to the Project Representative following the Final Inspection of the Project.

The Contractor's final payment will not be processed until the "Record Set" of drawings are received and approved by the Project Representative.

24. MEASUREMENT AND PAYMENT

Review these Contract Documents for additional Measurement and Payment specifications for definitions. Quantities are listed on the Bid Proposal for Payment Items. Additional material quantities, volumes, and measurements may be shown on the Contract Document drawings and/or specifications.

Unit Price quantities and measurements shown on the Bid Proposal are for bidding and contract purpose only. Quantities and measurements supplied, completed for the project, and verified by the Project Representative shall determine payment. Each unit price will be deemed to include an amount considered by the Contractor to be adequate to cover Contractor's overhead and profit for each bid item.

The Owner or Contractor may make a Claim for an adjustment in Contract Unit Price if the quantity of any item of Unit Price Work performed by the Contractor differs materially and/or significantly (increase or decrease by 50%) from the estimated quantity indicated on the Bid Proposal.

Lump sum bid item quantities will not be measured. Payment for these lump sum bid proposal items will be paid in full amount listed on the Bid Proposal when accepted by the Project Representative, unless specified otherwise.

SECTION 01010

SUMMARY OF WORK

All applicable portions of this specification section in the MPWSS shall apply with the following additions, deletions and/or modifications.

PART 1 GENERAL

1.3 WORK SEQUENCE

Add the following:

A. Complete all work on or before the dates specified in the Contract documents for each Bid Schedule awarded.

1.4 CONTRACTOR USE OF PREMISES

Add the following:

A. The proposed work will require crossing adjacent private land to access the site. The Landowner shall be notified prior to performing work and construction schedule. No sanitary or potable water services are available. The nearby Whitetail Reservoir Fishing Access Site has limited access for RV's and trailers, and has a toilet facility.

END OF SECTION 01010

SECTION 01050

FIELD ENGINEERING

All applicable portions of this specification section in the MPWSS shall apply with the following additions, deletions and/or modifications.

PART 3 EXECUTION

1.1 CONSTRUCTION SURVEY

A. Perform all survey, staking, recording of data, and calculations as necessary to construct the project from the initial layout to final completion. Reset stakes as many times as necessary to construct the work.

B. Set slope stakes and grade stakes at 50’ intervals on tangent sections and at 25’ on horizontal curves. Set slope stakes at PC and PT locations as well as the begin and end of project stationing. Limit grade stake tolerances to +/-0.3’.

PART 4 MEASUREMENT AND PAYMENT

Add the following:

A. Unless specifically noted otherwise, Construction Surveying shall be incidental to other work items in the contract and no separate payment shall be made.

END OF SECTION 01050

SECTION 01450

MOBILIZATION/DEMOBILIZATION

Added Section.

PART 1 GENERAL

1.1 DESCRIPTION

A. This item shall consist of the prepatory work and operations necessary performed by the Contractor for the movement of personnel, equipment, supplies, and incidentals to and from the work site. The work includes those actions necessary for obtaining necessary permits required for mobilization; for the establishment of all offices and facilities necessary to work on the project; for premiums on contract bonds; for insurance for the contract; and for other work on the various items on the project site. Mobilization costs for subcontracted work shall be considered to be included.

B. Contractor's cost for administration, bonding, insurance, and site documents shall be included in mobilization and shall not be paid as a separate item.

C. All equipment moved to the project sites shall be in good mechanical condition and free of fuel, oil, lubrication, or other fuel leaks. The Contractor shall immediately remove any equipment potentially or actually discharging environmentally damaging fluids.

D. All equipment moved to the project sites shall be thoroughly cleaned before it is brought to the sites to prevent the introduction of weed seeds. Equipment removed fro the sites may not be returned to the sites again until it is thoroughly cleaned again.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. There will be no direct measurement of this item.

4.2 PAYMENT

B. Partial payments for mobilization/demobilization will be made based on the lump sum bid price as follows:

- 25% of the amount bid for mobilization/demobilization when the Contractor has moved on-site and begun construction activities.
- 50% of the amount bid for mobilization/demobilization when 25% of the contract amount (exclusive mobilization/demobilization) has been completed.
- 75% of the amount bid for mobilization/demobilization when 50% of the contract amount (exclusive mobilization/demobilization) has been completed.
- 100% of the amount bid for mobilization/demobilization when 75% of the contract amount (exclusive mobilization/demobilization) has been completed.

END OF SECTION 01450

SECTION 01750

FINAL CLEANUP

Added Section.

PART 1 GENERAL

1.1 DESCRIPTION

A. This work consists of final cleanup of the project site prior to final acceptance.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 CONTRACTOR RESPONSIBILITES

The contractor shall be responsible for final clean up at the end of the project to a level satisfactory to the owner. All construction debris, no mater how small, shall be collected and removed from the site. All wheel ruts shall be filled in and be leveled to match the adjacent grade and material. Re-seeding or re-sodding, or other re-surfacing may be necessary to repair any construction related impacts or damage.

All survey markings, stakes, temporary paint marks, flagging and other devices shall be removed regardless of who installed them. All excess pavement, concrete, gravel, soil, or other construction materials not intended for permanent use shall be removed.

All final slopes shall be dressed manually to remove woody debris, accumulated trash and oversized material. Any new slope or topsoil surfaces shall be hand raked to provide a uniform appearance. The contractor shall dress all gravel, pavement and concrete edges to eliminate abrupt edges and provide a smooth transition. All construction related temporary sediment control devices shall be removed as soon as practical.

PART 4 MEASUREMENT AND PAYMENT

4.1 PAYMENT

Unless specifically noted otherwise, all final cleanup work shall be incidental to other work items in the contract and no separate payment shall be made.

END OF SECTION 01750

SECTION 01800

EROSION AND SEDIMENT CONTROL

Added Section.

PART 1 GENERAL

1.1 DESCRIPTION

A. This work consists of furnishing, constructing, and maintaining permanent and temporary erosion control and sediment control measures as shown on the project drawings and/or project related construction permits.

PART 2 PRODUCTS

2.1 GENERAL

A. Temporary and erosion control products utilized include but are not limited to backfill material; berms; brush barriers; erosion control blankets, bales, wattles, logs, rolls; erosion control culvert pipe; detention basins; fertilizer; geotextile; mulch; plastic lining; riprap; sandbags; seed; silt fence; and water.

2.2 EROSION CONTROL WATTLES

A. Where designated, provide a sediment retention product made from straw and coconut fiber reinforced with a 100% bio-degradable netting. Use wood stakes to secure sediment retention product in place, spacing per the manufacturer's recommendations. An acceptable product is *Sediment Stop*, manufactured by *North American Green*, or approved equal.

2.2 EROSION CONTROL BLANKETS

A. Where designated, provide a sediment retention product made from straw and coconut fiber reinforced with a 100% bio-degradable netting. Use wood stakes to secure sediment retention product in place, spacing per the manufacturer's recommendations. An acceptable product is *BioNet® S150BN™*, manufactured by *North American Green*, or approved equal.

PART 3 EXECUTION

3.1 INSTALLATION

A. Provide permanent and temporary erosion control measures to minimize erosion and sedimentation during and after construction according to the contract erosion control plan, environmental permits, and as directed by the Project Representative. These erosion control measures shall be designed, implemented, and maintained by the

Contractor in accordance with Best Management Practices (BMPs) to control erosion and sediment release from the work site.

B. Install permanent and temporary erosion control measures according to the Storm Water Pollution Prevention Plan (SWPPP), if applicable, approved construction permits, and erosion control drawings.

C. When erosion control measures are not functioning as intended, immediately take corrective action.

PART 4 MEASUREMENT AND PAYMENT

4.1 MEASUREMENT AND PAYMENT

A. Unless specifically noted otherwise, Erosion and Sediment controls shall be incidental to other work items in the contract and no separate payment shall be made.

END OF SECTION 01800

SECTION 02230

STREET EXCAVATION, BACKFILL AND COMPACTION

All applicable portions of this specification section in the MPWSS shall apply with the following additions, deletions and/or modifications.

PART 1 GENERAL

1.3 DENSITY CONTROL TESTING

A. FIELD DENSITY TESTING

Delete this section and add the following:

In-place field density tests for quality assurance are at Contractors expense meeting AASHTO T310 (ASTM D6938), Nuclear Densometer Methods. Quality assurance field density testing frequency is once per compacted lift, or as directed by Engineer.

Retesting of failing areas is at the expense of the Contractor.

B. LABORATORY MAXIMUM DENSITY and OPTIMUM MOISTURE

Delete this section and add the following:

Quality assurance tests will be made by the Contractors independent testing laboratory for each on-site natural soil or each source of off-site material, including borrow material, to determine the laboratory maximum density values and optimum compaction moisture content under AASHTO T99 or ASTM D698.

PART 3 EXECUTION

3.1 CLEARING AND GRUBBING

Add the following:

Obtain necessary burning permits if cleared and grubbed material is burned on site. All stumps within construction limits shall be grubbed under this contract.

3.4 EXCAVATION

Add the following:

Sheeting, Shoring, and Bracing: Except where trench banks are cut back on a stable slope, provide and maintain all sheeting, shoring, and bracing necessary to protect workers, and to protect adjoining grades and structures from caving, sliding, erosion or other damage in accordance with Occupational Safety and Health Standards (29 CFR Part 1926 – Construction Standards for Excavations), the Site Specific Health and Safety Plan, and other applicable codes and governing authorities.

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND PAYMENT

Delete this section and add the following:

A. CLEARING AND GRUBBING

1. Clearing and grubbing will not be measured for payment and is considered incidental to other work items in this Contract.

B. EXCAVATION AND EMBANKMENT

1. Excavation and embankment work will not be measured for payment and is considered incidental to other work items in this Contract.

END OF SECTION 02230

SECTION 02910

REVEGETATION

All applicable portions of this specification section in the MPWSS shall apply with the following additions, deletions and/or modifications.

PART 1 GENERAL

1.1 DESCRIPTION

Add following:

This work also includes conserving, placing, and finishing topsoil placement at designated areas on the project drawings or as directed by the Engineer.

PART 2 PRODUCTS

2.1 SEED

Add the following:

Utilize the following seed mix for all areas to be seeded.

Seed Name	% Pure Live Seed	Lbs. Per Acre
Western Wheatgrass	30	*
Bluebunch Wheatgrass	20	*
Hard Fescue	20	*
Slender Wheatgrass	15	*
Green Needlegrass	10-15	*

* Drilled Rate = 8 lbs/acre, Broadcast and Hydroseed Rate = 16 lbs/acre

2.2 TOPSOIL

Add the following:

Utilize all salvaged topsoil conserved from clearing and grubbing operations to cover excavation and embankment slopes prior to fertilizing, seeding, or mulching.

2.4 FERTILIZER

Add the following:

When broadcast seeding, apply the fertilizer separately. When drill seeding, do not apply seed and fertilizer in a single mixture. The fertilizer must be applied separately, either broadcast before seed application, or surface banded during seeding.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

Delete this section and add the following:

A. Placing conserved topsoil will not be measured for payment and is considered incidental to other work items in this Contract.

END OF SECTION 02910

SECTION 02990

SHEET PILE WEIR REPAIR

PART 1 GENERAL

1.1 DESCRIPTION

A. This work consists supplying all labor, materials and equipment necessary to repair frost heave damage to the lower three existing sheet pile weir curtains.
Repair shall include, but not be limited to removing the steel weir caps from the top of the sheet pile curtains. Driving the sheet piles to design elevations as required, and repairing and replacing the weir caps. The work will also consist of driving "H" piles adjacent to the weirs and installing bracing. Salvage and re-installing the existing cobble channel armor to the original design section, re-vegetating disturbed areas and providing BMPs for sediment control.

PART 2 PRODUCTS

2.1 H-PILES, WEIR CAPS, BRACING

A. "H" piles shall be standard HP8x36 or larger.
B. Bracing shall be standard angle steel 4"x4"x3/8" or larger, ASTM A36 steel.
C. If sheet pile extensions are needed to repair damaged areas, sheet piles used for extension or replacement of the existing sheet piles shall match the existing in all respects. Note: Sheet pile specified in the original project was SZ-22 meeting ASTM A36. Confirm specifications of existing sheet pile before purchase of repair materials.
Similarly if repairs to the weir caps require replacement, materials must match the existing in all respects. Note: Steel specified in the original project was standard 3/8" angles and plate. Confirm specifications of existing steel before purchase of repair materials.

PART 3 EXECUTION

3.1 GENERAL

A. Access: The adjacent landowner has given permission to access the site over his access road. Two weeks prior to arriving on site the Contractor shall provide the adjacent Landowner with a written schedule of anticipated operations. In addition, the Contractor shall contact the adjacent Landowner 24 hours prior to moving major equipment onto or off the site. The Contractor shall minimize disruptions to the adjacent Landowner's access to his property. The Contractor shall bear the cost of moving any utilities or any improvements to the access made for the benefit of the Contractor's access. The

Contractor may not remove or alter landscaping without written approval of the adjacent Landowner. The Contractor shall repair any Contractor caused damage to the adjacent Landowner's property. The Contractor assumes all liability for his actions while on the adjacent Landowner's property.

B. Hours: The adjacent Landowner's residence is near the work site. The Contractor shall limit operations that cause excessive noise to weekday hours of 7:00am to 8:00 pm. Weekend hours shall be limited to 9:00am to 7:00 pm. Examples of operations generating excessive noise would be pile drivers and large excavators. Other operations such as welding, cutting steel, operating small power equipment and maintaining equipment may be done outside the above hours. These hours may be modified by written agreement between the Contractor and the adjacent Landowner. Supply a copy of the agreement to the Montana Fish, Wildlife & Parks (FWP) Project Manager.

C. Environmental Concerns: All equipment and vehicles that have been used off road or in other water bodies shall be pressure washed before coming on site to prevent the spread of noxious weeds and invasive species. All equipment and vehicles brought on site shall be free of fluid leaks. The Contractor shall be responsible for cleanup of any fluids or other detrimental materials spilled by his operations. The Contractor shall repair any damage to the ground surface and vegetation caused by his actions. Areas disturbed shall be smoothed, fertilized, seeded with and owner approved grass seed mixture and raked smooth. (See applicable Specification Section).

The Contractor shall employ Best Management Practices (BMPs) to minimize the possibility of contamination of State waters by soil, chemicals or other detrimental materials. Submit a written BMP plan to the FWP Project Manager a minimum of two weeks prior to the beginning of operations.
The Contractor shall be responsible for maintenance of BMPs until Contract Close Out. At Contract Close Out the Owner shall assume maintenance of the BMPs. At Contract Close Out the Contractor shall hand over the BMPS to the owner in good repair and fully maintained. Unless the Contractor makes written arrangements with the Owner for salvage of materials the BMP materials shall become the property of the Owner.

D. Remove Existing Weir Caps: The existing weir caps shall be removed from the lower three sheet pile weir curtains. The intent is to reuse the pile caps on the weir curtains. The Contractor shall take care to minimize damage to the caps during removal and storage. Sections of Caps that cannot be removed and salvaged shall be replaced with new sections of Caps matching the originals in materials and construction.

E. All welds shall be to AWS standards. Welds shall not exhibit cracks, unfilled craters, slag inclusions, poorly formed beads, under or over welding, misalignments, excessive porosity or warpage.

F. Sheet Pile Welding: Welding of sheet piling shall be with low hydrogen type electrodes in accordance with the Structural Welding Code, AWS D1.1. Splices shall be butt welded. No butt welds shall be exposed to view at the completion of the project. If necessary to drive the piles without deflection at the splice, plates may be used. Splice plates shall be manufactured from 3/8" plate steel and shall be diamond shaped or tapered. Welds between the splice plate and sheet pile face shall be ¼" continuous around the perimeter.

G. Welds for bracing, the weir cap, “H” piles and Steel Angle brackets shall be ¼” fillet welds.
Welds between the steel angle and the plate steel on the weir curtain caps shall be 6” at 18” on centers.
The weir curtain caps shall be welded to the sheet piling faces at all contact edges. Welds shall be 6” across the contact faces of each pile. Welds shall not extend across the joints between the sheet piles.
If there is a gap greater than ¼” between the cap angle steel and the face of the sheet pile use steel shims as necessary to provide steel to steel contact between the angle and the pile faces. If there is a gap greater than ½” contact the Project Manager for direction.
(See section 3.2 for welds for Steel Angle bracing and “H” piles)

H. Driving Equipment: The Contractor shall provide the necessary driving equipment. The equipment shall be capable of driving the specified sheet pile to the depth and alignment shown.
Driving hammers may be drop, single acting, double acting, diesel, vibratory, or as approved by the Engineer. Drop hammers shall weigh between 1000-3000 lbs. with drops of 12 to 48 inches. Single acting, double acting and diesel hammers shall develop at least 7000 ft-lbs. with ram weights of at least 1400 lbs. Vibratory hammers shall be at least 40 hp and capable of driving at a minimum of 1000 vpm. Regardless of the type of hammer utilized, the energy developed by the hammer shall be of sufficient energy to adequately drive the sheet pile without damaging it.
Pile driver leads shall be of a type that will hold the pile and pile hammer in proper alignment during the driving operations and shall be long enough to preclude the necessity for the use of punches or chasers. Leads for drop hammers shall be steel or steel shod. Generally, the recommendations of the pile hammer manufacturer shall be followed with respect to pile leads.
Piles shall be protected at all times from damage during driving. This shall include but is not limited to the use of suitable caps, rings, heads, blocks, and mandrels. A driving cap shall be used at all times and the heads of the steel piles shall be cut square to accept this cap. It will be the Contractor’s responsibility to provide those items (driving heads, mandrels, etc.) necessary to drive specific pile types per the pile manufacturer's recommendations.

I. Pile Extensions: If pile extensions are required, the Contractor shall extend the existing piles as necessary. Extension shall be made by either welding extensions to the existing piles and driving them down to the required penetration depth or by pulling the existing piles and replacing with longer piles of the appropriate length and penetration. The Contractor may use either of these methods or a combination of them. The Contractor may reuse pulled piles provided they are not damaged. Piles being replaced rather than extended shall have no more than one splice.
The minimum penetration for all piles shall be 13.75’ from the surface of the existing ground. The existing ground surface is the soil surface and does not include the Cobble Armoring placed over the soil surface. Depth of penetration shall be from the lowest point of the pile/existing surface interface.

J. Driving: The Contractor shall provide the Project Manger a schedule of operations two weeks prior to the anticipated start of operations. The Contractor shall provide notice to the Project Manager three (3) business days before start of operations requiring the Project Manger's on site presence.

The piles shall be driven in such a manner as to ensure full interlocking of each pile. The piles shall be held in proper alignment during driving by means of assembling frames or other suitable temporary guide structures. Temporary guide structures shall be removed when finished. Pre-excavation or trenching shall not be allowed.

All piles shall be driven at least to the depth and penetration shown and specified on the plans unless otherwise directed by the Project Manager.

If a pile hits refusal prior to reaching the required depth and penetration and can no longer be driven without damage to the pile or driving the pile out of alignment then driving of the pile shall cease. Refusal shall be determined by inability of driving equipment to drive a pile more than one inch with four blows of the driving hammer operating at normal capacity. If a pile is starting to deform or move out of alignment prior to determining if it has hit refusal then driving shall also cease.

In all cases of refusal the undriven portion of sheet pile shall be measured by the Project Manager or the Owners designated Representative for inclusion in the As-Builts. If the pile is trimmed to the specified elevation before the Project Manger can measure it the cut off section shall be marked for identification and saved on site for inspection and measurement by the Project Manager prior to removal of this material from the site.

When cut off to the specified elevation the top of the extended piles shall not vary from the existing centerline alignment by more than one inch horizontal.

The Contractor shall provide a method acceptable to the Project Manager to mark the pile extensions to accurately indicate the final depth of bury and the additional square footage of pile installed. Use marking methods such as scribing or paint that will last until completion of the Project.

K. Pile Cutoff: The Contractor shall cut the piles off at the elevations shown or specified on the plans. The head of each pile, after cutoff, shall be sound, undamaged material. The length of cutoff shall be sufficient to permit the removal of all damaged material.

J. Defective Piles: Any pile damaged, driven out of its proper location, driven below the specified cutoff elevation or inaccurately cut off shall be corrected by one of the following methods, whichever is approved by the Project Manager.

a) The defective pile shall be pulled and replaced or re-driven.

b) The defective pile shall be trimmed, spliced and the pile driven until the splice weld is buried

All piles pushed up due to the driving of adjacent piles or by any other cause shall be driven down again to their specified elevation. Any sheet pile ruptured in the interlock, or otherwise damaged during driving, shall be pulled and replaced.

H. Corrective Surface Heave: Any excess material resulting from displacement of earth by pile driving shall be removed. Materials disturbed by pile driving shall be reconditioned and compacted to a density equal to that of the adjacent undisturbed material.

K. Reinstall Weir Caps: Reinstall Weir Caps as per the original detail. Repair or remake damaged welds.
Elevations of the finish top surface of the Weir Caps shall be uniform and to the original elevations. Maximum deviation from the specified elevation shall be 0.1'.

In addition: To ensure uniform flow across Weir Crest the maximum deviation of the Cap from the horizontal across the Crest portion of the weir curtain shall be 0.02'(1/4"). The maximum deviation of the Cap from the horizontal across the top of the weir curtain Wing Walls shall be 0.04'(1/2").
The Maximum deviation from plumb of the vertical components of the Weir Cap shall be 0.04'(1/2").
To minimize flows between the top of the sheet piles and the underside of the Weir Cap the top of the sheet piles shall butt up tight with the underside of the Weir Cap across the Crest portion of the weir curtain. In no case shall the gap be greater than 0.02'(1/4"). It shall not be necessary to weld the top of the sheet piles to the underside of the weir cap. If damage from the frost jacking or the removal and salvage operations of the existing weir caps makes reinstallation of the weir caps to the specifications difficult or impossible the Contractor may cut away the damaged portions and replace with new materials matching the existing or replace the cap in its entirety. New material shall be welded to old with butt welds where the materials butt together and with fillet welds where the materials over lap. The Contractor shall stagger joints where possible to maximize joint strength.

L. Weep Holes: Weld patches over original Weep Holes before driving piles deeper. Cut new Weep Holes in the pile extensions as per the original drawings.

M. Reset Existing Cobble Armor to the Original Section: After all other work is complete re-contour the existing soil and reset the existing cobble armor to the original section as shown in the drawings.

N. The Contractor shall keep legible, detailed daily notes of all phases of installation in a format acceptable to the Project Manager.
In addition to the standard information included in daily notes such as dates, hours of operations, job site conditions, personnel & equipment on site, operating hours of major equipment, etc. the Contractor shall keep detailed notes on each individual pile driven including length of material trimmed from the piles, length of material added to the piles, length of pile extension driven, length of pile extension at refusal, misalignments and other problems encountered.
The intent is to have a detailed record of individual pile penetrations to aid in making decisions about methods to be used and to have an accurate As-Built Record at the end of the project.

3.2 “H” PILE & BRACING

A. Steel angle bracing and “H” pile installation.

Each Curtain consists of three sections:

1.) Two abutments (9 piles each)
2.) The weir crest (22 piles)

After the piles are driven back to design elevations, install the 4”x4” steel angle bracing across the entire curtain as shown on the drawings.

Note: The upper and lower runs of steel angle bracing shall overlap. The intent is to have both runs of bracing welded to the same downstream sheet pile face at the overlap. The lower run shall extend into the abutment section to the outside edge of the first full downstream sheet pile face. The brace shall be welded to this face. The upper run shall extend to the inside edge of the same downstream face and be welded to the face. See drawings.

B. The steel Bracing shall be welded to the sheet piling with 6” fillet welds at all contact edges, top and bottom. Welds shall not extend across the joints between the sheet piles. Steel Braces will be constructed of 20’ or longer lengths to minimize splices, trimming only to meet brace length requirements.
Splices in the bracing shall be butted together and spliced with 3/8” plate. Splice plates shall be ½” narrower than the surface being spliced to allow for a fillet weld and shall extend 1-1/2 times the width of the splice surface on either side of the joint. Splice plates shall be used on both horizontal and vertical surfaces. Welds shall be continuous fillet welds, as indicated on the contract drawings.

Locate bracing so that any misalignment of the sheet pile curtain that may not allow good contact between the bracing and the sheet pile faces for welding, may be minimized.

C. Trench as necessary alongside of the abutments to install the bracing and make connections with the “H” piles. Salvage topsoil and subsoil separately for re-use. Lay slopes back as necessary to provide safe access to the trench. After the bracing, “H” piles and all connections are complete and approved by the Project Manager backfill the trench to the original grade. Place salvaged subsoil fill in a maximum of 12” loose lifts and compact with hand operated vibratory compaction equipment. Add or remove water as necessary to achieve good compaction. Spread salvaged topsoil and seed as specified in appropriate specifications.

D. “H” piles driven adjacent to the abutments shall be driven a minimum depth of 18’ below the elevation of the weir crest. In no case shall any pile be driven less than 15’ below the existing grade. Piles shall be driven close enough to the sheet piling to make the specified connections to the piling. Piles shall be driven straight and plumb with an appropriate driver to meet the required embedment depth.

E. Welds: "H" Piles shall be securely welded to the adjacent sheet piles with steel angle connections as shown on the plans. Welds shall be ¼" continuous fillet welds along all contact edges between the sheet pile faces, the angle brackets and the "H" piles (See Details).

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

A. Costs associated with access to the site and repair of disturbed surfaces will not be measured for payment and are considered incidental to other work items in this Contract.

4.2 METHOD OF MEASUREMENT

A. Steel bracing shall be measured on a unit basis. The unit shall be shown in the Unit Price Table of the Standard Bid Form for the pay item corresponding to this specification number. Steel Bracing shall be measured in the following manner:

1) Linear Feet: Steel Angle Bracing materials shall be measured on an installed quantity basis. The quantity shall be the linear feet of Steel Angle Bracing material furnished and installed. Installation includes all cutting, splicing and welding to the requirements of the Drawings and Specifications.

B. "H" piling shall be measured on a unit basis. The unit shall be shown in the Unit Price Table of the Standard Bid Form for the pay item corresponding to this specification number. "H" piling shall be measured in the following manner:

1) Linear Feet: "H" piling materials and installation shall be measured on an installed quantity basis. The quantity shall be the linear feet of "H" pile material furnished and installed to specified depths.
The measurement for "H" piling installation shall not include materials trimmed to meet specifications or to repair damage to the pile. No separate measurement shall be made for installation of sheet pile material driven past specified depths.

C. Salvage, repair and replacement of the weir caps is a Lump Sum item and shall not be measured. Payment for salvage, repair and replacement of the Weir caps shall be paid at the Lump Sum Bid price as listed on Standard Bid Form. Payment shall include all labor, materials, equipment and incidentals to provide the work complete and in place.

D. New Sheet piling (if required) shall be measured on a unit basis. The unit shall be shown in the Unit Price Table of the Standard Bid Form for the pay item corresponding to this specification number. Sheet piling shall be measured in the following manner:

1) Square Feet - Plan Quantity (SF-P): Sheet piling materials and/or installation shall be measured on a plan quantity basis. The quantity shall be the neat line square feet of additional sheet pile material furnished and installed to design depths as measured from the construction plans.
The measurement for sheet piling installation shall be reduced for that amount of sheet pile material not driven to design depths. No separate measurement shall be made for installation of sheet pile material driven past design depths.

E. Re-contouring the existing soil and re-setting Existing Riprap is a Lump Sum item and shall not be measured. Payment for Re-contouring the existing soil and Resetting Existing Riprap shall be paid at the Lump Sum Bid price as listed on Standard Bid Form. Payment shall include all labor, materials, equipment and incidentals to provide the work complete and in place.

F. Providing and maintaining BMPs is considered incidental to other work items in the contract and no separate payment shall be made. BMPs shall include all labor, materials, equipment and incidentals to provide the work complete as required.

END OF SECTION 02990

LOG OF TEST BORING

JOB NO. ZGE #95-156 VERTICAL SCALE 1" = 4' BORING NO. 5

PROJECT Whitetail Dam, Whitetail, Montana

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 2494.0)	GEOLOGIC ORIGIN	N or CR	WL	SAMPLE NO.	SAMPLE TYPE	LAB TESTS W	D	LL	PL	QU or RQD
2.0	TOPSOIL, mostly ORGANIC SANDY LEAN CLAY, a little gravel, dark brown, frozen	Topsoil			1	SB					
4.0	SANDY LEAN CLAY, a little gravel, brown, firm (CL)	Glacial Till	9		2	SB					
	SANDY LEAN CLAY, a little gravel, grayish brown, mottled, firm, a few lignite fragments, pockets of lime-like material (CL)		10		3	SB	14	114			
			11		4	SB					
			16		5	SB					
			15	▼	6	SB					
13.5											
15.5	SILTY SAND, fine to medium grained, a little gravel, brown, wet, medium dense (SM)	Coarse Alluvium	16		7	SB					
	End of Boring										

Collective bag sample from 2'-11'.

START 12-20-95 COMPLETE 12-20-95 @ 1741

METHOD 4" FA 0' to 24'

CREW CHIEF Jim B.

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
12-20	1641	15.5'	None	12'		11.5'

ZELTINGER GEOTECHNICAL ENGINEERING, P.C.

LOG OF TEST BORING

JOB NO. ZGE #95-156 VERTICAL SCALE 1" = 4' BORING NO. 1

PROJECT Whitetail Dam, Whitetail, Montana

SURFACE ELEVATION 2491.0

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N or CR	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	LL	PL	QU or RQD
2.0	FILL, mostly SANDY LEAN CLAY, a little gravel, brown and dark brown mixed, some organics, frozen	Fill			1	SB					
	FILL, mostly SANDY LEAN CLAY, grayish brown, mottled, frozen to 3.5', pockets of dark brown sandy lean clay with organics		15		2	SB					
6.0			11		3	SB					
	FILL, mostly SANDY LEAN CLAY, a little gravel, brown and dark brown mixed		9		4	SB					
			15		5	SB					
			14		6	SB					
			8		7	SB					
			10	▼	8	SB					
23.0	FAT CLAY, gray, mottled, firm, specks of lignite (CH)	Lacustrine	15		9	SB					
25.5	End of Boring										

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
12-20	1330	25.5'	None	23.5'		21'

START 12-20-95 COMPLETE 12-20-95 @ 1330

METHOD 4" FA 0' to 24'

CREW CHIEF Jim B.

ZELTINGER GEOTECHNICAL ENGINEERING, P.C.

SITE PLAN FOR BOREHOLE LOCATIONS (APPROXIMATE)